

Case Study: Anterior Shoulder Dislocation Restoration and Prognosis

Abstract

Shoulder dislocations often occur as the result of a trauma that has shifted the head of the humerus out of its normal position in the glenoid fossa of the shoulder joint. Anterior dislocations are the most common, and they often present with severe shoulder pain and instability. Diagnosis is based on symptoms of the patient and confirmed through an examination of an X-ray. Initial treatment consists of shoulder reduction techniques to restore the normal humerus position but is often followed by several weeks of limited arm use, rest, physiotherapy, and possibly surgery based on the case. This is a common joint dislocation that presents to an emergency department and this case study further examines its presentation and treatment based on a case presented to the Ste. Rose General Hospital emergency department.

Introduction

The shoulder joint is one of the major joints found in the human body. It is composed of three bones – the scapula, clavicle, and humerus. Two separate joints in the shoulder, the acromioclavicular joint between the acromion of the scapula and the clavicle, and the glenohumeral joint between the glenoid cavity of the scapula and the humeral head, create the ability to move the arm in a variety of directions. The primary muscles that support the shoulder joint are the rotator cuff muscles, made up of the supraspinatus, infraspinatus, teres minor, and subscapularis¹.

Due to a shallow glenoid that only articulates with a small portion of the humeral head, the shoulder joint can be unstable. The fibrous tissues that join the separate bones can also be

stretched or torn, further complicating injuries such as shoulder dislocation. Shoulder dislocations account for over 50% of all major joint dislocations, either anteriorly, posteriorly, or inferiorly¹. Anterior shoulder dislocations are the most common, accounting for 90-95% of all shoulder dislocations⁷. These dislocations can occur when a patient takes a significant force, such as a blow, to the shoulder that causes bones to be pulled out of place. Rapid and extreme rotations can pop the humerus out of the glenoid socket and this often occurs in contact sports or motor vehicle accidents (MVA)³. Patients with a previous history of shoulder dislocations have an increased risk of subsequent dislocations in the same location because the tissue either does not heal properly or because it decreases in the tension it can provide to maintain a healthy joint⁷. Children and young adults are most at risk for this injury and its re-dislocation because of their higher regular activity level compared to adults and seniors. Those with a rotator cuff tear or a fractured glenoid also present a higher incidence for re-dislocation⁷.

Diagnosis

A thorough history uncovering an adequate mechanism of injury is often times sufficient to diagnose the patient with an anterior shoulder dislocation. Typical instances include a blow to an abducted, externally rotated, and extended arm, or with a significant posterior humerus force, or a fall on an outstretched arm. On exam, the humerus is usually abducted and externally rotated, and the acromion appears prominent. Associated injuries in up to 40% of anterior dislocations include nerve damage, tears and fractures associated with the labrum, glenoid fossa, or the humeral head.

At the onset of the injury, patients will most often report a popping sensation, sudden onset of pain in the shoulder joint, a decreased range of motion (ROM), and a sensation of the humeral head rolling out of the socket. A lower proportion of patients also report stinging and numbness in the arm at the time of dislocation. On thin patients there may appear a prominent humeral head felt anteriorly, and a void can be seen posteriorly, suggesting the shift of the humerus anteriorly out of its proper location. Evidence of these symptoms and visual indications by clinicians will confirm the presence of an anterior shoulder dislocation.

Since the axillary nerve normally wraps the proximal humerus anteriorly to posteriorly to innervate the deltoid and teres minor, it can become damaged during dislocation in approximately 40% of cases. To examine its possible injury, it is necessary to conduct an injured arm neuromuscular exam before and after reduction of any dislocated shoulder, assessing sensation and movement and imaging through electrophysiological technology and MRI. Pre-reduction imaging through X-ray for associated fractures is recommended especially when trauma is known. Relevant fractures occur in about 25% of dislocations.

Imaging

An X-ray image is particularly required after reduction of a shoulder dislocation to ensure that the joint has returned to its normal positioning, but it can also be useful for pre-reduction imaging to uncover associated fractures and should be performed when trauma is known. The most common X-rays are captured in anteroposterior views in neutral, external, and internal rotations, but can also be taken in lateral views in the scapular plan and an axillary view².

Possible associated fractures include fractures of the tuberosity, Bankart lesions, Hill-Sachs deformities, and reverse Hill-Sachs lesions¹. Bankart lesions occur when the glenoid labrum is disrupted with or without the addition of an avulsed bone fragment, with those involving the inferior anterior labrum being most prevalent. Hill-Sachs deformities are the result of a compression fracture of the posterolateral humeral head with anterior shoulder dislocations, while reverse Hill-Sachs are seen in posterior dislocations. CT scans are not typically used but are only in cases when a surgery is required to examine bone loss or a possible vascular injury¹. MRIs are best for soft tissue damage analysis of the labrum, axillary nerve, or shoulder capsule, but are also infrequently used based on a patient history and physical exam suggesting it is a regular anterior shoulder dislocation¹.

Treatment

Short-term treatment for anterior shoulder dislocations consists primarily of a reduction by the clinician to re-insert the shifted humeral head back into the glenoid cavity of the scapula. This will relieve most pain immediately and typically return the arm to its normal stable state after several weeks of rest⁹. Since some patients present with excruciating pain limiting the reduction techniques attempted by the clinician, conscious sedation with fentanyl, midazolam, ketamine, etomidate, or propofol can be used while CO₂ levels are monitored through capnography⁹. In instances when conscious sedation is not required, an intraarticular injection of 10 cc of local lidocaine or a similar anesthetic can be used⁸. There exist several cases in which a reduction would be contraindicated. Fractures of the humeral neck can lead to avascular necrosis and those injuries including neurovascular compromise should not be attempted for reduction due to the risk of a further, more complicated injury⁷.

Typically, reduction requires the use of 1-3 techniques to reach reinsertion of the humeral head back into the glenoid cavity and can be performed in under 10 minutes. Other cases, however, can be increasingly difficult and can require up to 30-45 minutes for proper reduction. There are nine techniques that will be further explained⁹.

Scapular Manipulation

This technique provides 80-100% success when thoroughly performed. The patient is positioned upright or prone. The clinician stands behind the patient, places a thumb of his hand over the tip of the scapula, and pushes medially while pushing the acromion inferiorly with the other hand's thumb. An assistant can simultaneously provide traction by holding the patient's wrist of the affected arm with one hand and maintaining a flexed elbow with the other hand. The elbow would be pressed down on, initiating an external rotation of the humerus. The successful reduction may be subtle and without an obvious 'pop' that can be heard with other manipulations⁹. The procedure can be attempted several times over the span of a few minutes before attempting an alternative maneuver.

External Rotation Technique

This technique prioritizes reducing the anterior glenohumeral dislocation by minimizing spasm of the internal rotators of the humerus, relieving the wind on the joint capsule, and restoring the posterior pull of the external rotators on the humerus. This technique is simple compared to some others and can be performed by a single healthcare practitioner while the patient remains supine with an elbow flexed to 90 degrees. The elbow of the patient is supported by one hand of the

practitioner, the wrist with the other, and the arm is guided down to the side of the patient while the forearm is simultaneously externally rotated. The patient typically pauses upon experiencing pain, but as the muscles relax over 5 to 10 minutes, it externally rotates, and reduction is achieved⁹. Typically, reduction occurs with an external rotation of the arm between 70 to 110 degrees.

Cunningham Technique

The patient is seated with the examiner facing the patient, as they place the hand of the injured arm on top of the examiner's shoulder with elbow flexion. The examiner places the hand of the arm which the patient has his hand on in the patient's elbow crease while using the other hand to massage the patient's biceps, deltoid, and trap muscles. The patient is instructed to relax and retract their shoulder blades together as they straighten their back⁹. This protocol is repeated several times over a few minutes to achieve reduction. The Cunningham technique is a popular maneuver especially since it rarely requires conscious sedation of the patient to minimize pain and discomfort.

Milch Technique

In this procedure, the patient is supine, while the clinician's hand to the patient is placed on the injured shoulder with their fingers over the anterior deltoid and their thumb in the axilla for stabilization. The arm is externally rotated with the clinician's other hand, and then abducted over the patient's head. External rotation must be maintained and direct pressure by the other hand must be provided over the proximal humeral head until reduction⁹. The Milch technique is most often performed if an external rotation was unsuccessful.

Stimson Technique

No assistant is required, and this technique requires no conscious sedation. The patient lays prone with the injured arm hanging over the side of the bed. A 5 to 15 lb weight can be held by the patient with their injured arm to further facilitate the reduction, but it can also be achieved without added weight⁹. As the patient remains in this position, reduction is usually reached within 30 minutes. This technique can provide the least discomfort for the patient but the time necessary to achieve reduction of the shoulder joint is slightly lengthened relative to other techniques.

Traction Countertraction

A cloth sheet is used in the traction countertraction technique by wrapping it under the axilla of the injured arm and pulling by one of the assistants towards the other side of the patient's body to induce countertraction, while the injured arm is pulled gently towards the opposite direction of the sheet to provide continuous traction until reduction⁹.

Spaso Technique

This procedure is common and often attempted to restore the injured shoulder joint. The patient is supine, while the examiner grasps the wrist or distal forearm of the affected arm and lifts it vertically with a gentle vertical traction and external rotation⁹.

Fares Technique

The patient remains supine with the affected arm at their side. The examiner grasps the patient's wrist and gently pulls the arm to induce traction, abducting the arm slowly while simultaneously rotating the humerus anteriorly and posteriorly in minimal oscillating movements with a diameter around 10 cm. If the shoulder has not reduced at the moment 90 degrees of abduction is reached, the external rotation technique is incorporated⁹.

Fulcrum Technique

The patient is supine or sitting upright for this technique, with a rolled towel or sheet placed in the axilla of the affected arm and pulled on posteriorly by an assistant. The clinician adducts the distal humerus and induces traction anteriorly, while the posterolateral force on the humeral head is maintained by the assistant⁹. This maneuver requires an increased amount of force and may have further complications for the patients if performed too aggressively, resulting in this technique experiencing minimized use over the years in the clinic.

Post-Reduction

Once shoulder reduction has been achieved, patient discomfort and pain are significantly reduced and replaced by sensations of weakness and a dull soreness in the area of injury. The arm is placed in a sling to be used for at least 1 to 2 weeks and a sleeping sling or sleeve is recommended to be used for several weeks after the dislocation. A neurovascular exam is encouraged to ensure there is no damage and reduced capability of the axillary nerve. This nerve innervates the deltoid and teres minor and provides sensation to the lateral shoulder and is the nerve most often compromised in over 40% of dislocations, however, the nerve symptoms usually resolve upon successful reduction². Post-reduction imaging through X-ray can be

performed to ensure that the joint was properly restored. A follow-up consult with an orthopedic surgeon can be arranged to discuss options for surgery to prevent continuous recurrence of the dislocation. One study performed over 10 years determined that conservatively managed patients without surgery exhibited a 62% recurrence rate of the same shoulder dislocation compared to 9% in those patients that underwent a surgical repair⁴. An arthroscopic surgical stabilization of the joint provides the patient with an improved shoulder mobility, satisfaction, and a quicker return to activity in which the arm is used regularly. A surgical repair is often an appealing option for patients that are at high risk for recurrence and have experienced a traumatic anterior shoulder dislocation, are between the ages of 21 and 30 years old, and who participate in high-risk activities or sports⁴. Surgical options are very dependent on the case at hand and a consultation with an orthopedic surgeon is often encouraged⁵.

Non-steroidal anti-inflammatory medications for pain and discomfort such as ibuprofen and naproxen are prescribed for 1 to 2 weeks post-reduction, and a referral to physiotherapy is provided to rehabilitate the shoulder and minimize the occurrence of a dislocation again in the future. 4 to 6 weeks of physiotherapy is typical during the recovery period, although recovery strongly depends on the patient's age, overall health, whether the shoulder has been injured previously, and the severity of the dislocation at the time of presentation⁶. This rehabilitation prioritizes stretching and strengthening of the muscles surrounding the shoulder and seeks to increase flexibility and restore its range of movement.

Recurrence of the same dislocation are very common, with some studies reporting rates over 70% even following appropriate treatment of the initial dislocation¹. These re-dislocations can be the result of shoulder anatomy deformities present following the initial dislocations, such as an abnormal laxity of the joint capsule and surrounding muscles, deformities of the heat of the

humerus, or a fixed tightening of the muscles surrounding the glenohumeral joint¹. Each re-dislocation would further deteriorate the already existent deformities present in the shoulder after the initial injury and would complicate adequate recovery to restoring normal glenohumeral joint function.

Case Analysis

Patient Presentation

A 35-year-old female presented to the emergency department with severe right shoulder pain that radiated down her humerus and into her elbow and an inability to move her right arm. She stated that she had slipped in the shower 30 minutes before arrival and used her arms to prevent a complete fall but dislocated her right shoulder in the process while catching herself. She had experienced a dislocation of this shoulder several times in the past, with the most recent dislocation occurring a month prior. The patient was not aware of any other injuries or damage to her body elsewhere after the fall.

Upon examination, the patient expresses extreme pain with yelling upon touching of her injured arm and attempts at trying to gently move it by the physician. The prominent head of the humerus appears inferior of its regular location just below the acromion and the patient is unable to move her arm upon request. She maintains the arm internally rotated with her elbow flexed at 90 degrees and supported by her other hand. The patient is in distress, with breathing over 20 breaths per minute indicating slight tachypnea, an elevated heart rate around 90 bpm, an increased blood pressure over 140/90, and no elevated temperature. She has no other current medical problems, no regular medications that she is taking, no allergies, up to date immunizations, and no previous history of relevant surgery. This dislocation is the 4th or 5th

dislocation of her right shoulder with successful reduction, treatment, and rehabilitation followed in the past. Based on the appearance of the glenohumeral joint, her pain and inability to move her arm, and previous history of this dislocation occurrence, it appears that she has an anterior shoulder dislocation.

Imaging

An X-ray of the right injured shoulder was taken in antero-posterior and axillary views and presented the common appearance of an anterior shoulder dislocation, with the humeral head and outline of the glenoid being incongruent. The humeral head was located anteriorly, medially, and inferior to its original placement and the glenoid fossa. These findings are indicative of an anterior shoulder diagnosis. No other fractures or bone deformities were noted.

Treatment

Several techniques were attempted to achieve reduction of the dislocated shoulder over the course of 20 minutes. Since the patient was in severe pain and was unable to move or shift position into prone, she lay supine with her back support slightly angled upwards at 30 degrees. The Milch technique was first attempted but was not successful, so the external rotation technique was initiated. Due to the patient's high level of pain and inability of the examiner to move her arm sufficiently, she was given a dose of fentanyl and midazolam intravenously (IV). After several minutes allowing her stress to decrease and sedation to relieve her sensations, the external rotation was repeated and followed by the spaso technique. There was no noticeable reduction, so the external rotation needed to be repeated once more before reduction was achieved. There was no audible 'pop' as the humeral head returned to its normal position, but it

was clear that the dislocation was restored due to the appearance of the arm and comparison to the other healthy joint. The patient's sedation reached a level in which she was not able to communicate her relief of the dislocation symptoms but upon examination of the range of motion and limited presentation of pain, the reduction was successful. The repeat of X-rays post-reduction indicated that the dislocation of the glenohumeral joint was restored.

Long-Term Prognosis

The patient was discharged from the emergency department when her level of sedation decreased, and she was able to express the relief of her pain and sensation following the reduction. She was given a sling to wear for 1-2 weeks, a prescription for ibuprofen for pain and discomfort, referred to local physiotherapy, and arranged a consult with an orthopedic surgeon. Since this was not the first re-dislocation for her, it would be important to further investigate the integrity of the glenohumeral joint with the aid of an orthopedic specialist and prevent continuous re-dislocation.

Conclusion

Anterior shoulder dislocations primarily occur in younger patients that have experienced trauma through physical activity or an accident. They are by far most common of the shoulder dislocations and patients present with severe levels of pain and an inability to move their arm. Appearance of the humeral head inferior of its normal position in the glenoid fossa are always evident and the dislocation can be easily identified through X-ray. Initial treatment requires an attempt at one or more reduction techniques and may require pain relief and sedation medication to achieve reduction. The prognosis of the restored injury presents a high chance of re-

dislocation and requires sufficient rest of the arm and rehabilitation through physiotherapy.

Further consult with an orthopedic surgeon may prove beneficial if a surgery is deemed to be performed.

Experiencing this case in the emergency department at the Ste. Rose General Hospital greatly intrigued me in shoulder dislocations and its adequate treatment and reduction as it was my first exposure to it as a medical student. My father has had this problem in the past, so it was even more interesting for me to learn what happens during an anterior shoulder dislocation, its treatment, and its prognosis.

References

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